

REMARKS

1. Restriction Requirement

The Office Action requires restriction to one of the following two sets of claims:

- I. Claims 1 – 19 and 27 – 29; and
- II. Claims 20 – 26.

Applicants affirm the provisional election of Group I. Such affirmation is made without traverse and, accordingly, Claims 20 – 26 have been canceled.

2. Drawings

Formal drawings are being submitted concurrently herewith, and reflect the change requested in the Office Action. For the convenience of the Examiner, an Appendix is provided in which the change to Fig. 5A is highlighted in red ink.

3. Specification

Applicants thank the Examiner for noting a typographical error in paragraph [20] and for noting the updated reference to the patent cited in paragraph [33]. These have been corrected as requested, as has another typographical error noted in paragraph [23].

4. Claims Rejections

Claims 1 – 19 and 27 – 29 have been examined. Claims 1, 2, 5, 8 – 10, 13, 16, and 17 stand rejected under 35 U.S.C. §102(e) as anticipated by U.S. Pub. No.

2002/0024735 ("Kleeman"); Claims 3, 4, 6, 7, 11, 12, 14, 15, 18, and 19 stand rejected under 35 U.S.C. §103(a) as unpatentable over Kleeman; and Claims 27 – 29 stand rejected under 35 U.S.C. §103(a) as unpatentable over U.S. Pat. No. 5,796,479 ("Derickson") in view of Kleeman.

a. Independent Claims 1, 9, and 17

Independent claims 1, 9, and 17 have been amended to better characterize aspects of the invention. In particular, the preamble of each of those claims has been amended to clarify that the diffraction grating and method for diffracting an optical signal are applicable to C-band optical telecommunications signals, which have an operational wavelength in the range of 1530 – 1565 nm, although this may be extended by about 30 nm on either end of the range (*see* Application, p. 7, ll. 6 – 9). Such applicability is reflected in amendments to the limitations of those claims, which now require that the average grating period correspond to a line density $1/a$ between 700 and 1100 mm^{-1} . This limitation was previously recited in dependent claims 3 and 11, which have accordingly been canceled.

The rejections of claims 3 and 11 rely solely on the disclosures of Kleeman and the assertion in the Office Action that "[i]t would have been obvious to one having ordinary skill in the art to adjust the grating period from that disclosed by Kleeman" (Office Action, ¶13). The basis for this assertion is stated to be from previous holdings that discovering optimum or workable ranges involves only routine skill in the art. Such holdings, however apply only to result-effective variables, which the grating period is not:

A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation.
MPEP 2144.05

Specifically, grating period is determined by the optical application for the grating and is not a parameter that can be varied in any significant degree in order to

optimize performance. This fact is not only noted in the application, which explains how a line density of $700 - 1100 \text{ mm}^{-1}$ is determined to be appropriate for C-band optical-telecommunications applications (Application, p. 7, ll. 6 – 9), but is also emphasized in Kleeman:

The width d [i.e. the grating period] is dependent on the optical application in which the reflection-diffraction grating is used.
Kleeman, ¶31.

Consistent with this teaching, Kleeman specifically limits its disclosure to gratings suitable for diffraction of ultraviolet light having a wavelength less than 250 nm (Kleeman, ¶20), completely outside the range of application contemplated by the amended claims. It is worth emphasizing in this regard that Kleeman views it as an “object of the ... invention” specifically to identify uses for the grating described therein. Other than noting that the grating may be used in a Littrow configuration and in third order, it provides only the examples of diffraction of ultraviolet sources in lithography applications (*id.*, ¶20) and for use during interferometric length measurements (*id.*, ¶21). There is no mention of C-band optical-telecommunications applications, despite the articulated objective of Kleeman to identify suitable uses.

Since the grating period is not a result-effective variable, but is instead a characteristic of the grating defined by intended applications, it would not be obvious to modify the disclosure of Kleeman for use in applications never contemplated by Kleeman. Stated differently, to change the grating period in the manner suggested in the Office Action would render the diffraction grating completely unsatisfactory for its intended use in ultraviolet-light applications. This has long been recognized as a factor that specifically indicates that the proposed modification is *not* obvious. MPEP 2143.

The allowability of each of Claims 1 – 19 is believed to ensue from the allowability of amended independent Claims 1, 9, and 17.

b. Dependent claims 5 – 7, 13 – 15, and 19

Applicants further note that the basis for rejection of several of the dependent claims, i.e. Claims 5 – 7, 13 – 15, and 19, is that it would be obvious to vary the width and/or height of the rectangular protrusions to optimize the efficiency of the grating. This basis fails to recognize, however, the criticality of the claimed ranges for such parameters. MPEP 2144.05. This criticality is manifested by the *simultaneous* achievement of high efficiency (in both S and P polarizations) with low polarization-dependent loss, a convergence that the application notes was fortuitous and unexpected (Application, p. 9, ll. 1 – 12). Notably, there is no hint of such criticality in Kleeman, which does not discuss at all the polarization-dependent loss, and certainly does not identify heights or widths where low polarization-dependent loss is combined with high efficiency. For this additional reason, these claims are believed to be allowable.

c. Claims 27 – 29

The rejections of claims 27 – 29 are based on it being obvious “to substitute the lamellar reflection diffraction grating of Kleeman ... for the diffraction grating” in a wavelength router of the type recited in independent Claim 27 (Office Action, ¶14). These rejections are respectfully traversed.

A *prima facie* rejection under 35 U.S.C. §103(a) requires establishing, *inter alia*, “some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings” and “a reasonable expectation of success.” MPEP 2143. The Office Action suggests that such a motivation is provided by the desire to use a diffraction grating having very high diffraction efficiency (Office Action, ¶14). As already noted above, however, there is no basis under which to expect the diffraction grating of Kleeman to be useful in wavelength-router applications. Kleeman specifically states its intention to identify appropriate uses for its grating, and then goes on to identify applications related to ultraviolet-light projection lithography and interferometric length measurements. This combination of disclosures is effective to limit the scope of

application for Kleeman's grating that is taught to those of skill in the art. Thus, not only is there no disclosure in Kleeman to suggest use of its grating in a wavelength router, but it actively teaches away from such use by narrowing and specifically pointing those of skill in the art in a different direction.

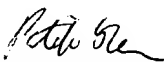
Furthermore, there is no reasonable expectation of success. As already discussed, it is well known to those of skill in the art, as acknowledged by Kleeman, that aspects of diffraction gratings may be dependent on the intended optical application. One of skill in the art would not reasonably expect substitution of a diffraction grating intended for ultraviolet-light projection-lithography or interferometric-length applications to be used successfully in a wavelength router.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 303-571-4000.

Respectfully submitted,


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